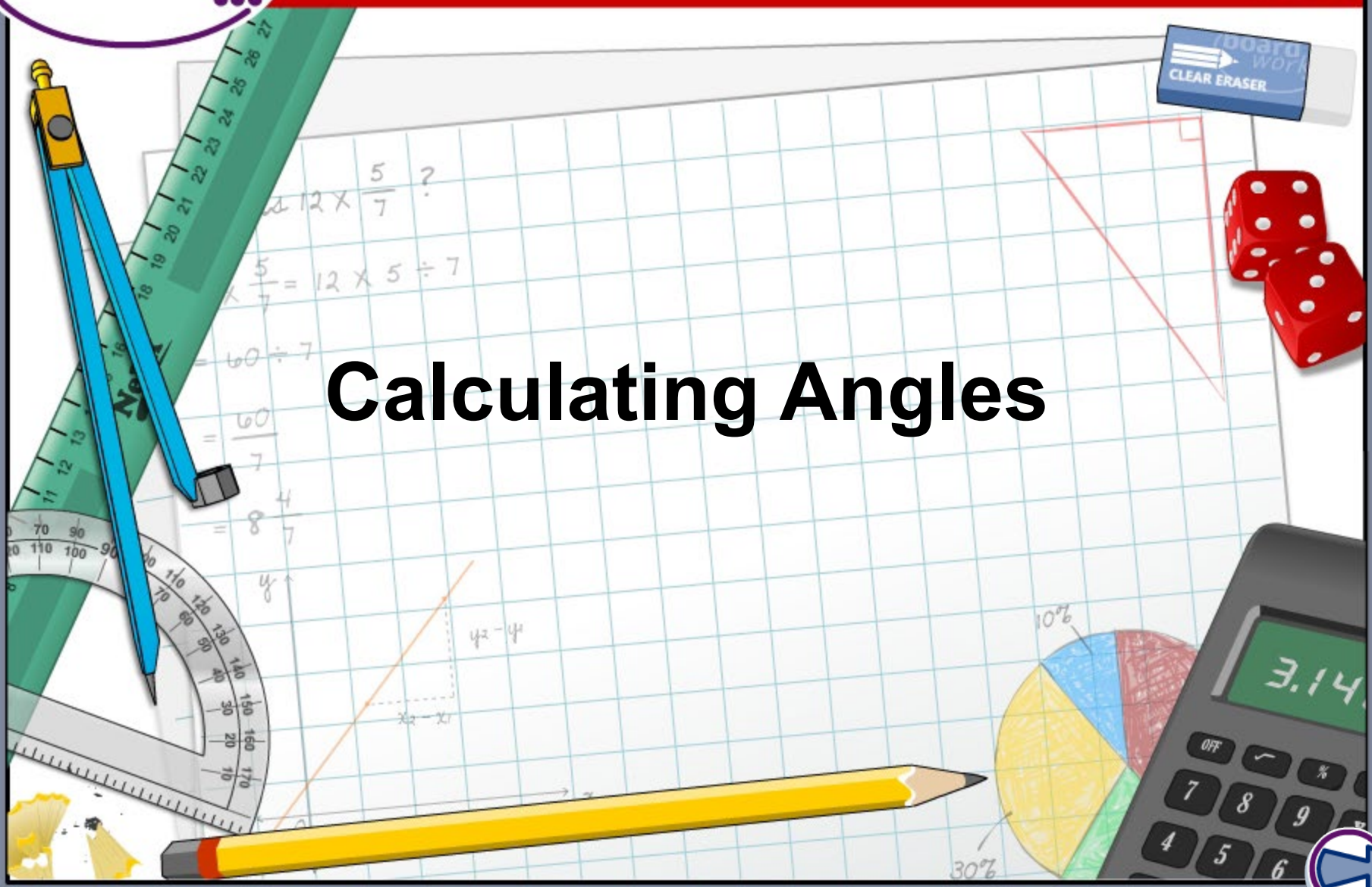


Calculating Angles

Information

Common core icons

This icon indicates a slide where the Standards for Mathematical Practice are being developed. Details of these are given in the Notes field.

Slides containing examples of mathematical modeling are marked with this stamp.

This icon indicates an opportunity for discussion or group work.

The **Standards for Mathematical Practice** outlined in the Common Core State Standards for Mathematics describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

These are:

1) Make sense of problems and persevere in solving them.

2) Reason abstractly and quantitatively.

3) Construct viable arguments and critique the reasoning of others.

4) Model with mathematics.

5) Use appropriate tools strategically.

6) Attend to precision.

7) Look for and make use of structure.

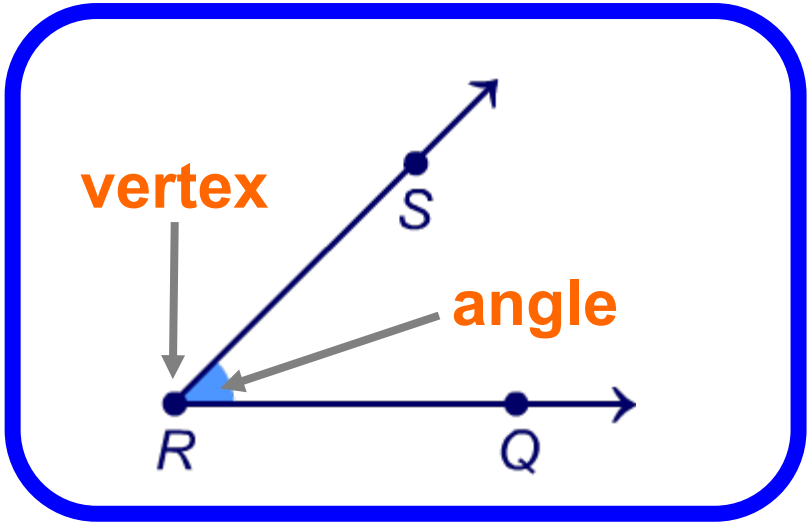
8) Look for and express regularity in repeated reasoning.

This icon indicates that the slide contains activities created in Flash. These activities are not editable.

This icon indicates teacher's notes in the Notes field.

Angles

An **angle** is formed by two rays with a common endpoint. This endpoint is called the **vertex** of the angle.



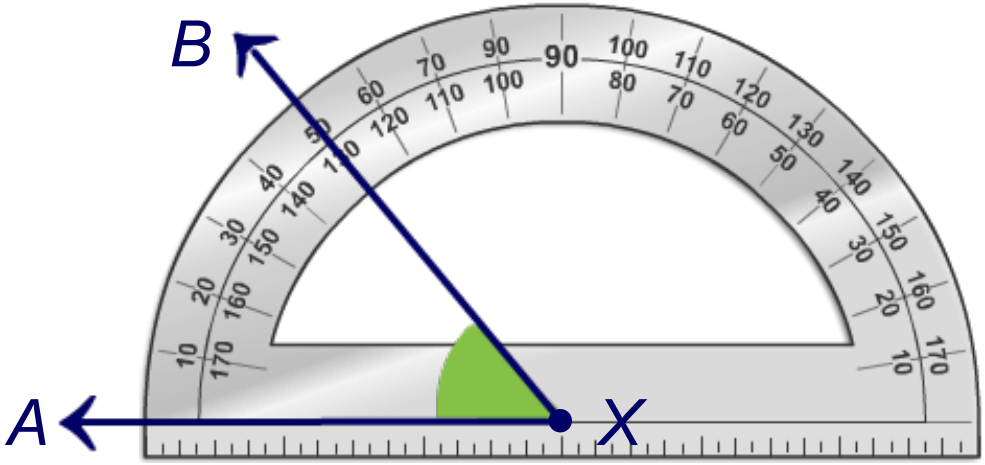
The angle symbol $\angle$ is used to indicate an angle.

The vertex and one point on each of the rays are used to describe an angle. The vertex is always the second point listed. The angle shown is written as:

$\angle QRS$ or $\angle SRQ$

Measuring angles

Angles have a **measure** that describes the relationship between the two rays. The measure of $\angle AXB$ is written as $m\angle AXB$.



An angle is measured using a **protractor**.

Angles are measured in **degrees**.

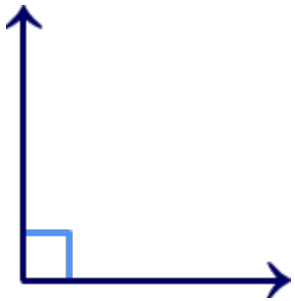
To measure an angle place the center point of the protractor on the vertex. One ray should pass through the 0° mark. Read the measure where the other ray crosses the scale.

$$m\angle AXB = 50°$$

Classifying angles

The measure of an angle determines what type of angle it is.

Can you name these different types of angles?



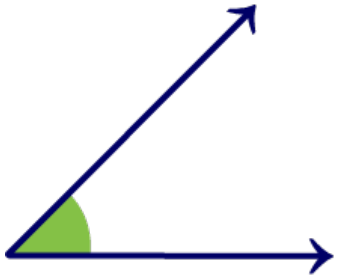
right angle

This measures exactly 90°.

straight angle

This measures exactly 180°.

acute angle



This measures more than 0° but less than 90°.

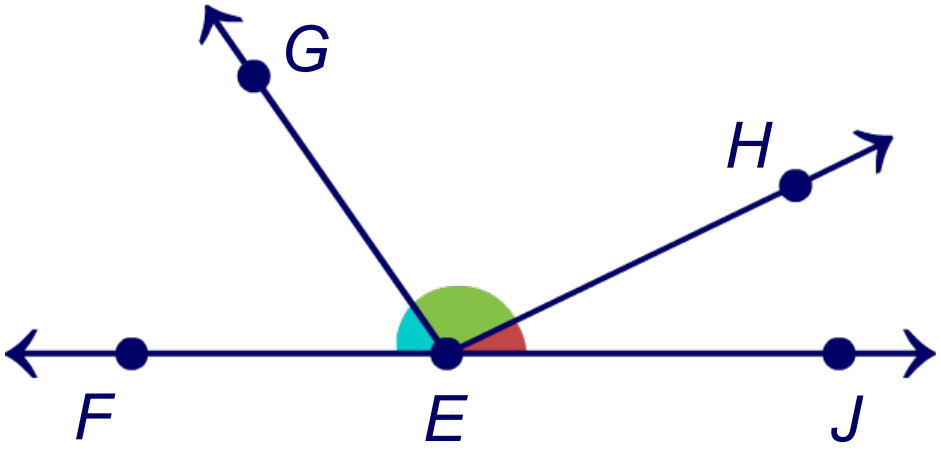
obtuse angle

This measures more than 90° but less than 180°.

Adjacent angles

Adjacent angles are two angles that share a side and vertex.

How many adjacent pairs are in the figure below?



$\angle FEG$ and $\angle GEH$

$\angle FEG$ and $\angle GEJ$

$\angle GEH$ and $\angle HEJ$

$\angle FEH$ and $\angle HEJ$

All the pairs share the same vertex at point E.

Types of angles

Complementary angles | Supplementary angles

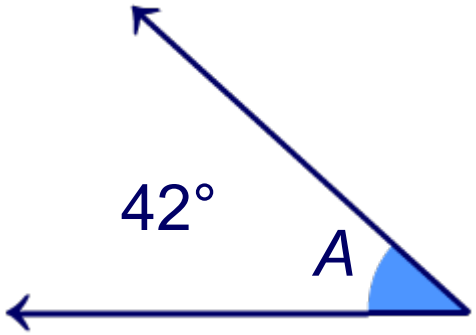
There are different ways to describe the relationships between sets of angles.

Press on the tabs above to learn more about **complementary** and **supplementary angles**.

Calculating angles

Can you calculate the missing angle in this complementary pair?

Angles A and B are complementary.
If $m\angle A = 42°$ what is $m\angle B$?



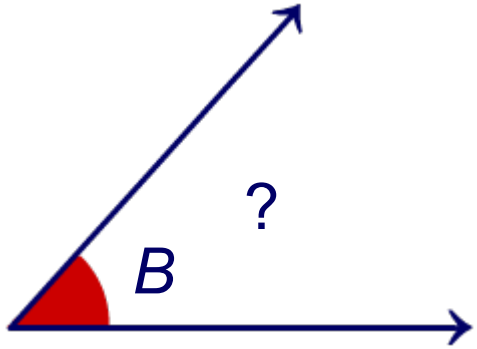
$$m\angle A + m\angle B = 90°$$

$$42° + m\angle B = 90°$$

Subtract 42° from both sides:

$$- 42° \qquad - 42°$$

$$\boldsymbol{m\angle B = 48°}$$



Identifying angles

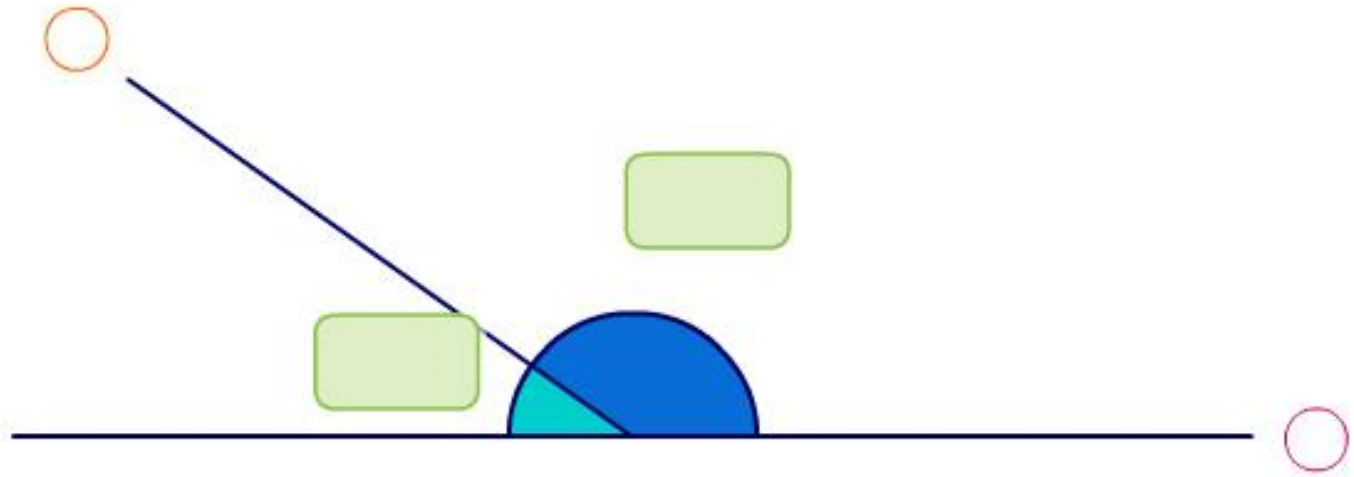
Using the protractor, identify the complementary or supplementary angles in the diagram.

Press **start** to begin.

start

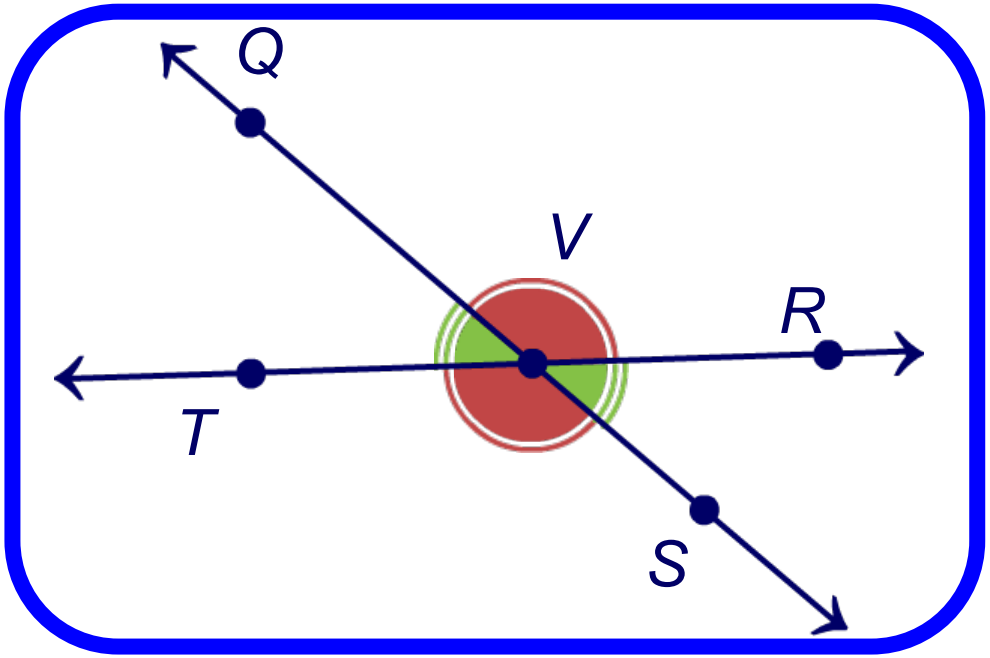
Angles on a straight line

Drag the orange circle to change the angles.
Drag the red circle to add a third angle.



Vertical angles

Vertical angles are opposite angles formed by intersecting lines.



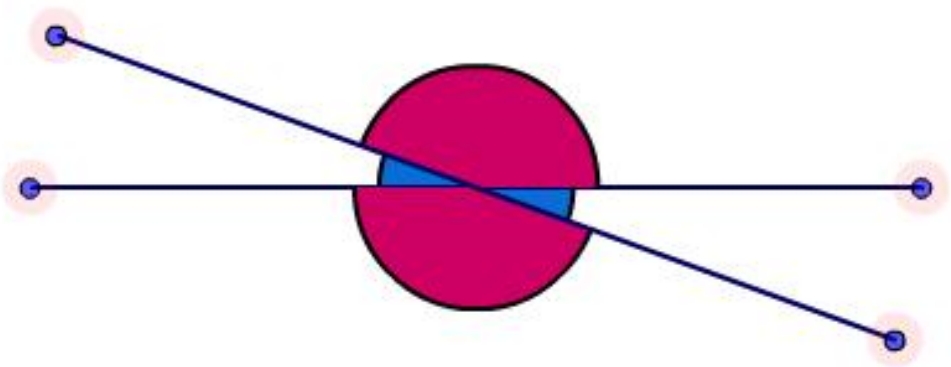
Vertical angles are equal.

$\angle QVR$ and $\angle TVS$ are vertical angles.

$\angle QVT$ and $\angle RVS$ are vertical angles.

Intersecting lines

Drag the ends of the intersecting to see how the angles relate to each other.



two lines

three lines

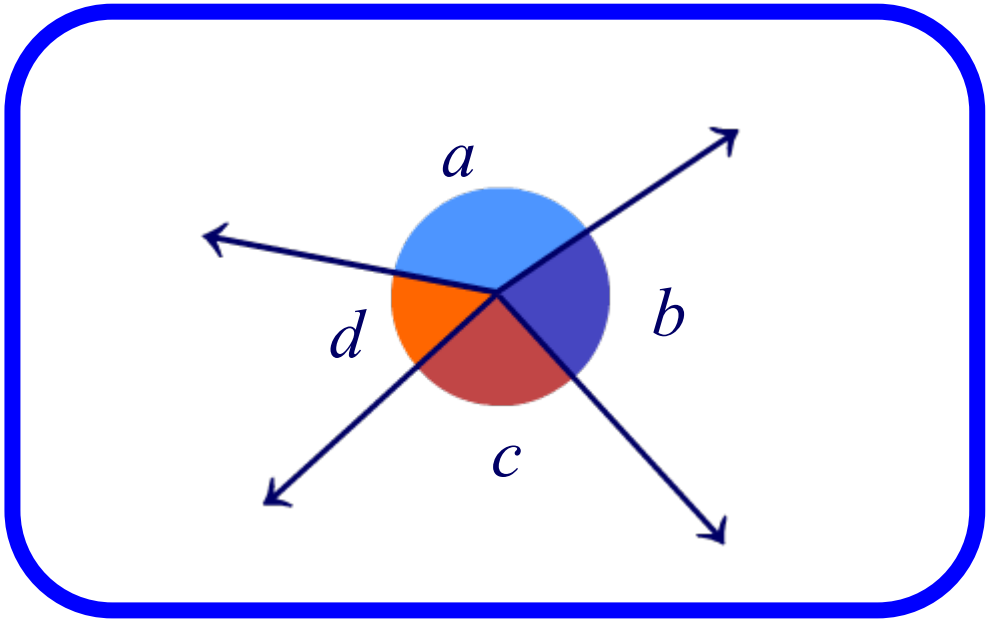
Vocabulary quiz

Match each term with its definition.

complementary	two angles that add up to 90°
supplementary	two angles that add up to 180°
adjacent	two angles that share a side and vertex
vertical	a pair of opposite angles created by intersecting lines

Angles around a point

Angles around a point add up to 360°.

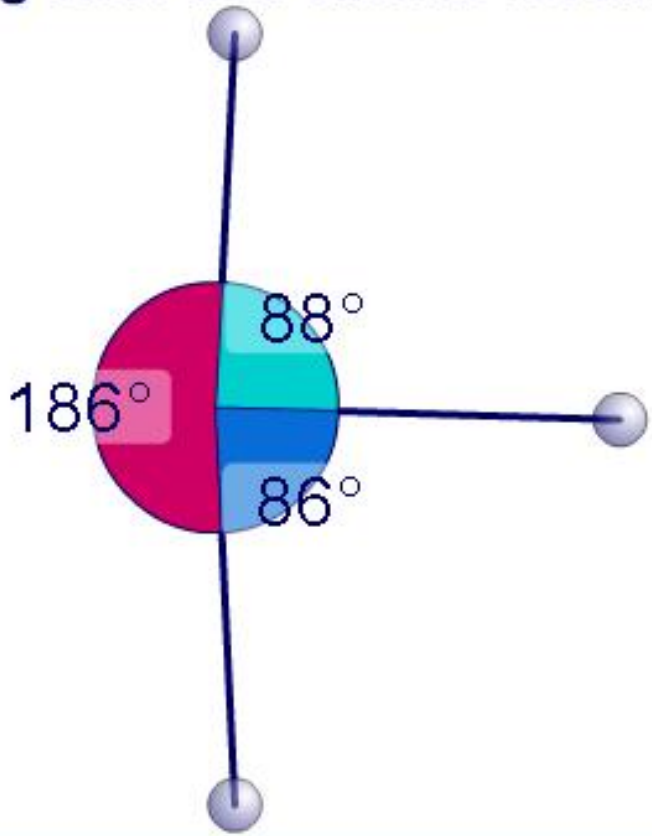


$\angle a + \angle b + \angle c + \angle d = 360°$

because there are 360° in a full turn.

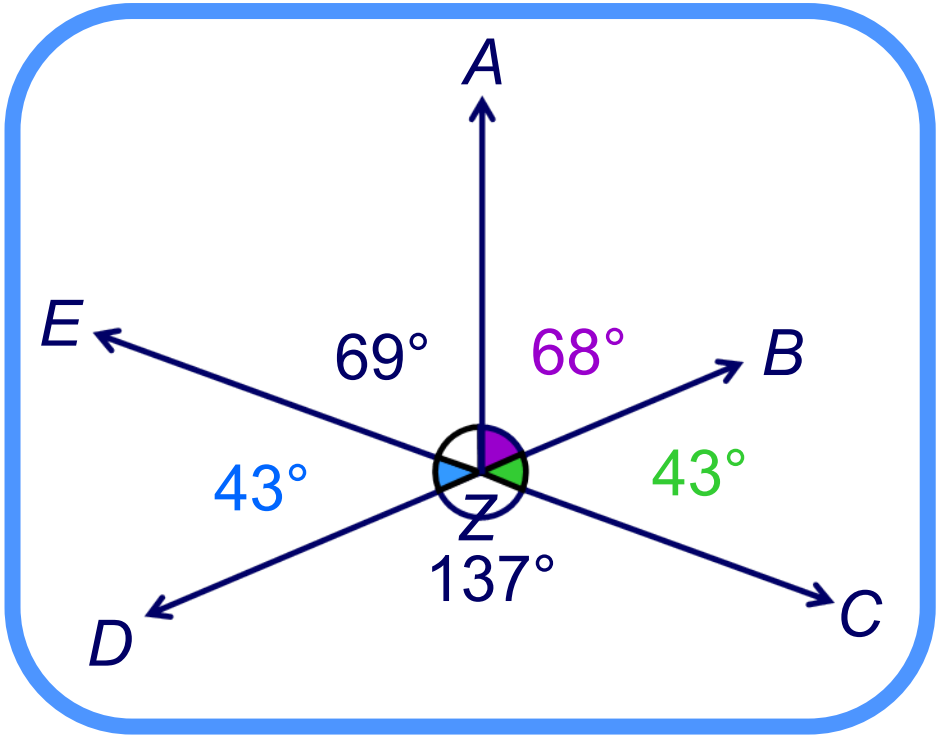
Angles around a point

Drag the points to change the angles.
Calculate the missing ones and click to reveal the answers.



Calculating angles around a point

Can you find the sizes of the missing colored angles?



$m\angle DZC = 137°$

$m\angle EZA = 69°$

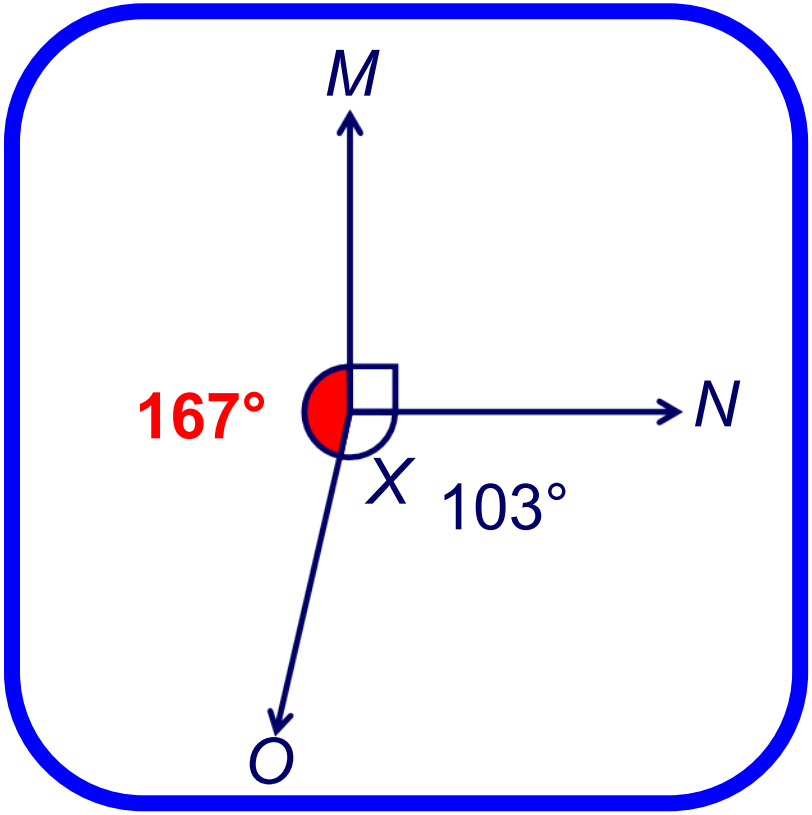
$m\angle AZB = 68°$

$m\angle EZD = 43°$

$m\angle BZC = 43°$

Calculating angles around a point

Claire was given the problem below and decided to use her knowledge that angles in a straight line add up to 180°. Will this help her find the measure of ∠MXO ?

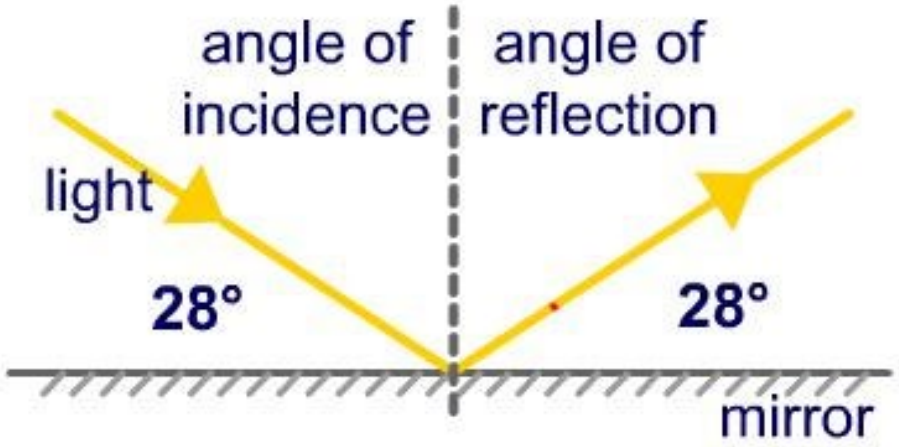


Can you find $m\angle MXO$?

Angle calculations

Question: 1/2

The diagram shows light hitting a mirror. The angle of incidence is the same as the angle of reflection. What angle is formed by the reflected light?

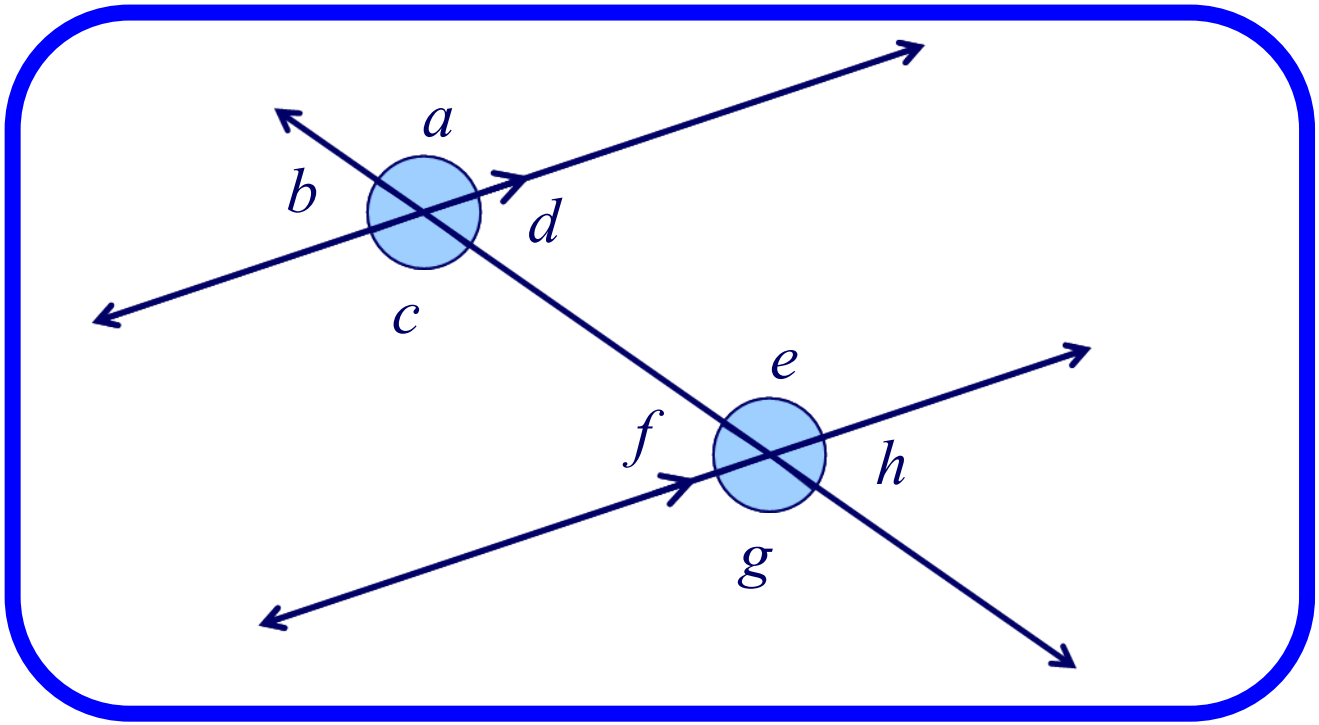


°

type in the answer above

Angles made with parallel lines

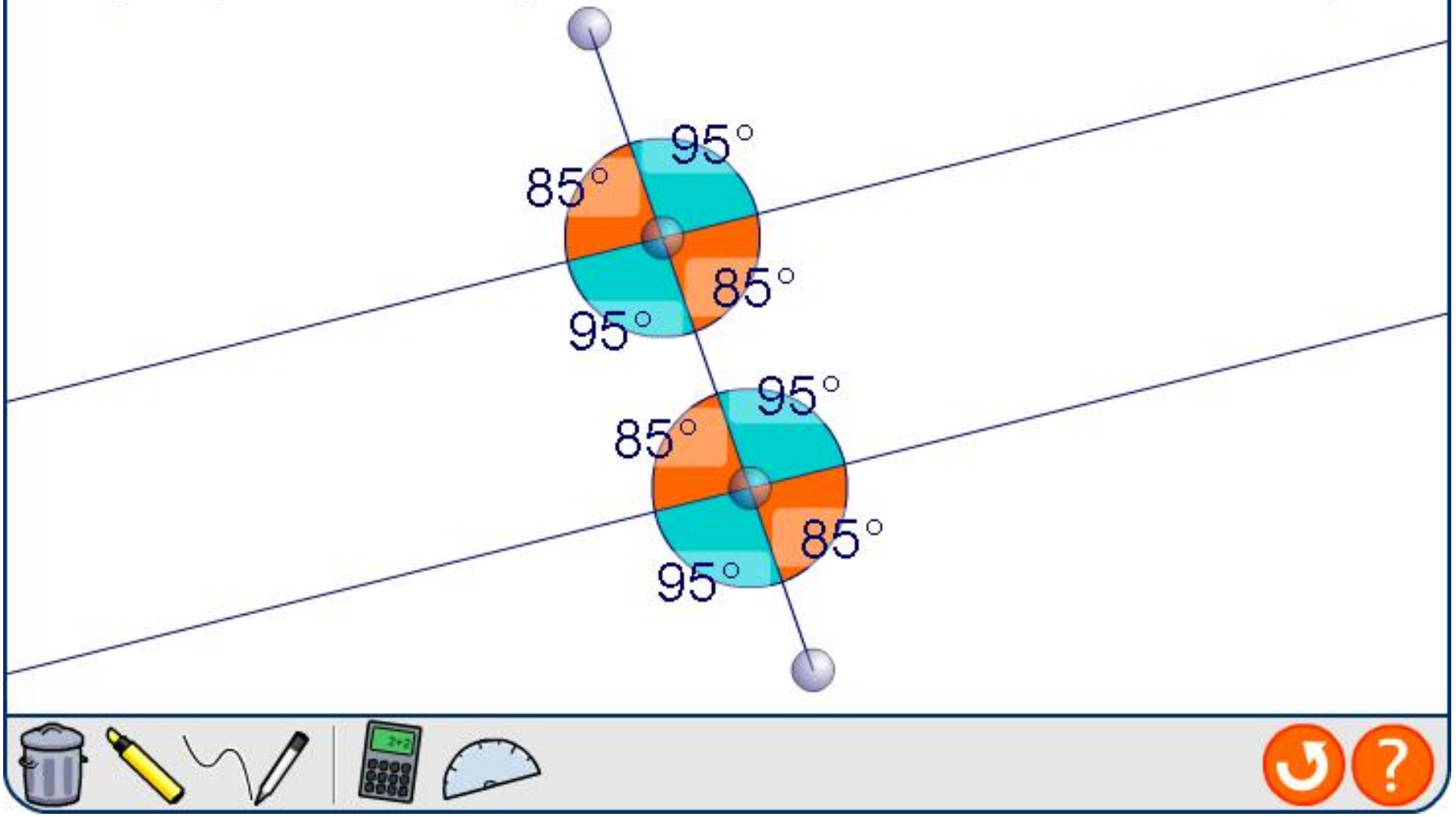
When two parallel lines are cut by a **transversal**, eight angles are formed.



Which angles are equal to each other?

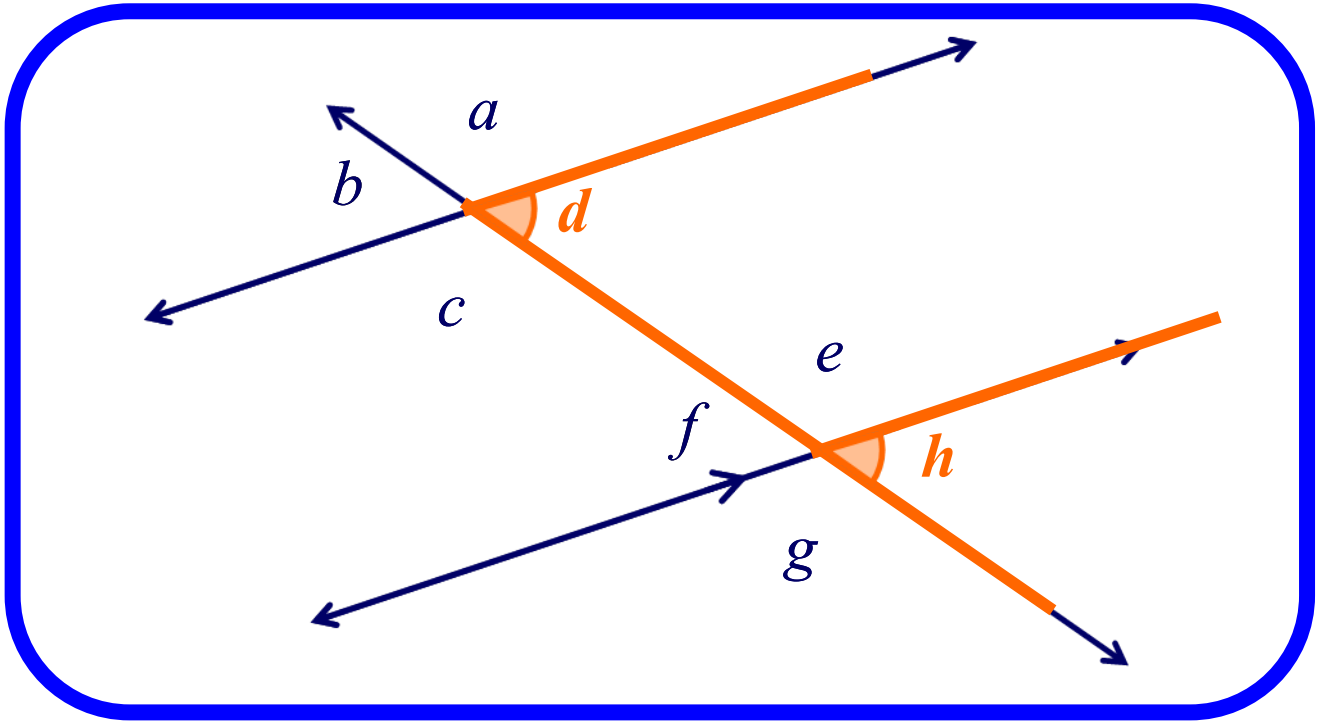
Angles made with parallel lines

Drag the points to change the lines. Press to hide/reveal the angles.



Corresponding angles

There are four pairs of **corresponding angles**.

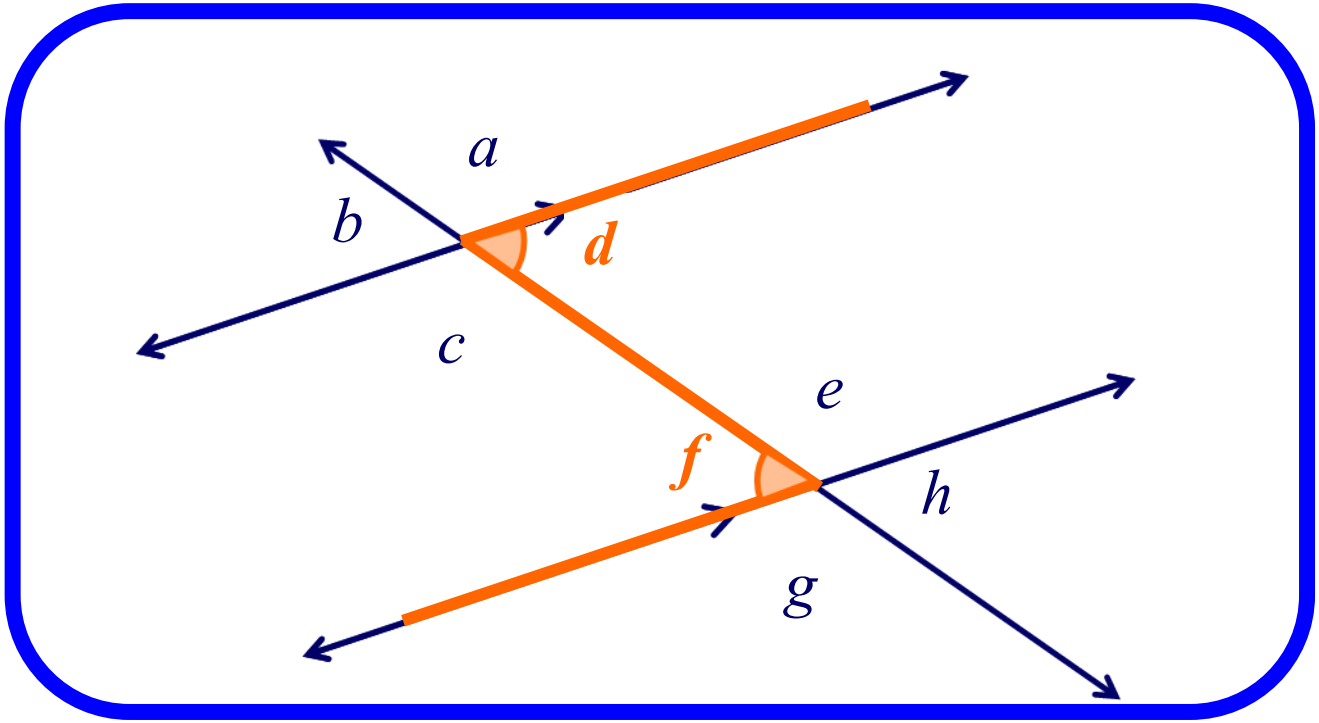


$d = h$ because
corresponding angles are equal.

Can you find the other three pairs of corresponding angles?

Alternate interior angles

There are two pairs of **alternate interior angles**.



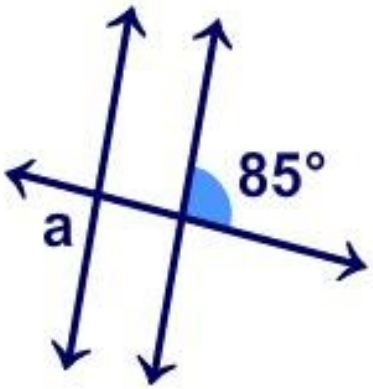
$d = f$ because

alternate interior angles are equal.

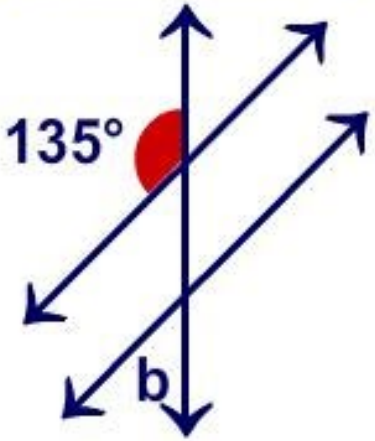
Can you find the other pair of alternate interior angles?

Angles made with parallel lines

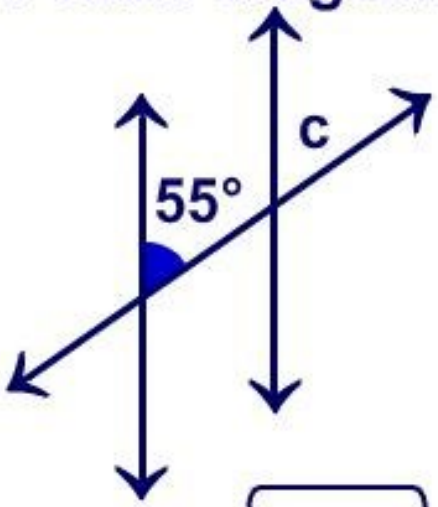
Drag the correct measure into place for each diagram



a = ☐



b = ☐



c = ☐

55°	95°	25°	45°	135°	125°	85°	35°